

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.-16. (Canceled)

17. (Currently Amended) A method of operating a vertical DMOS transistor

P. 15 2 in a complex integrated circuit, the DMOS transistor having a drain of first conductivity formed
3 above a buried region of same conductivity; ^{region}formed in a substrate of a second conductivity type,
4 a body ^{region}of the second conductivity formed in an epitaxial layer of first conductivity to form a pn
5 junction diode with the drain, a source ^{region}of first conductivity in the body, a gate electrode
6 positioned above the source, ^{region}the body, ^{region}and the epitaxial layer, a conductive contact coupled to
7 the drain, ^{region}and a metallic source contact coupled to the source, ^{region}to the body, ^{region}and to the epitaxial
layer to form a Schottky diode, the method comprising diverting current from flowing through
the body-to-drain pn junction diode of the DMOS transistor to flowing through the Schottky
diode that is co-integrated with the DMOS transistor when the metallic source contact becomes
11 more positive than ^{the} ^{region}[a] drain of the DMOS transistor by forward conduction voltage of the
Schottky diode to reduce the amount of source current reaching the substrate and substantially
P. 14 reduce operational characteristics of parasitic devices associated with the integrated circuit.

18. (Previously Presented) The method of claim 17 wherein the act of diverting current from the body-to-drain p-n junction diode of the DMOS transistor includes diverting current from a parasitic bipolar transistor having a collector coupled to a substrate in which both the DMOS transistor and the Schottky diode are integrated.

19. (Currently Amended) The method of claim 17 wherein the act of diverting current from the body-to-drain p-n junction diode of the DMOS transistor with a

Schottky diode includes diverting current from the body-to-drain p-n junction diode having a cathode coupled to the drain and an anode coupled to the source contact.

20. (Currently Amended) The method of claim 17 wherein the act of diverting current from the body-to-drain p-n junction diode of the DMOS transistor with a Schottky diode includes diverting current from the body-to-drain p-n junction diode with a Schottky diode having a cathode coupled to the drain and an anode coupled to the source contact.

21. (Currently Amended) A method of operating a vertical DMOS transistor in an integrated circuit having other devices formed therein, the DMOS transistor having an epitaxial layer of a first conductivity type formed over a substrate of ~~the~~ a second conductivity type, a deep barrier region formed within adjoining surface portions of the substrate and the epitaxial layer, a deep drain region extending from a surface of the epitaxial layer to outer peripheral regions of the deep barrier region to define a well region within the epitaxial layer, a body region of ~~a~~ the second conductivity type formed within the well region, first and second source regions of the first conductivity type positioned at a surface of the well region and within the body region, first and second portions of gate electrodes positioned above the first and second source regions, respectively, the body region, and the well region, a conductive drain contact coupled to the deep drain region, and a metallic source contact coupled to the first and second source regions and to a central portion of the well region, the metallic source contact forming a Schottky diode, and the body region forming a pn junction diode with the deep drain region, the method comprising:

diverting current from flowing through the body-to-drain pn junction of the vertical DMOS transistor to flowing through the Schottky diode that is co-integrated with the DMOS transistor when the first and second source regions become more positive than the deep drain region of the vertical DMOS transistor to reduce parasitic effects, including below ground effect and oversupply effect, and prevent latch up.

22. (Currently Amended) A method of operating a vertical DMOS device in a complex integrated circuit for reducing the effects of parasitic devices in the integrated circuit that drive an inductive load, the DMOS device including an epitaxial layer formed on a substrate; a well region formed by a deep drain region extending from a surface of the epitaxial layer and over a peripheral area of a deep barrier region located within adjoining surface portions of the epitaxial layer and the substrate; a body region within the well region, the body region containing first and second source regions; a plurality of insulated gate electrodes formed over outer portions and inner central portions of the first and second source regions, respectively, the body region, and the well region; a guard ring in a central surface portion of the well region and surrounded by the body region; a first metallic contact coupled to the deep drain region; and a Schottky metallic contact coupled to the source regions and to the central surface portion of the well region between the insulated gate electrodes and contacting the guard ring, the Schottky metallic contact forming a Schottky diode, and the body region forming a pn junction diode with the deep drain region, the method comprising:

diverting current from flowing through the body-to-drain pn junction of the vertical DMOS transistor to flowing through the Schottky diode that is co-integrated with the vertical DMOS transistor when the first and second source regions become more positive than the deep drain region of the vertical DMOS transistor; ~~and allow only 3% to 4% of the source current to reach the substrate.~~

23. (Currently Amended) A method of operating a vertical DMOS device in a complex integrated circuit for reducing operational effects of parasitic devices associated with the integrated circuit, the DMOS device including a well region defined by a buried isolation region having an overlapping deep drain region within an epitaxial layer; a body region containing first and second source regions within the well region; insulated gates formed over a portion of the first and second source regions; and a Schottky contact coupled to a central portion of the well region and spaced from the body region, the Schottky contact defining a portion of a Schottky diode within the epitaxial layer having operational characteristic means for reducing

operational characteristics of parasitic devices associated with the integrated circuit, and the body region forming a pn junction diode with the deep drain region, the method comprising:

diverting current from flowing through the body-to-drain pn junction of the vertical DMOS transistor to flowing through the Schottky diode that is co-integrated with the vertical DMOS transistor when the first and second source regions become more positive than the deep drain region of the vertical DMOS transistor ~~and allowing no more than 3% to 4% of the source current to reach the substrate.~~

24. (Currently Amended) A method of operating a vertical DMOS transistor in a complex integrated circuit, the vertical DMOS transistor including an epitaxial layer of a first conductivity type formed over a substrate of a second conductivity type; a drain region of the first conductivity type formed within the epitaxial layer; a body region of the second conductivity type formed within the epitaxial layer and forming a pn junction diode with the drain region; a source region of the first conductivity type formed within the body region; a gate electrode positioned above the source region, the body region, and the epitaxial layer; a conductive drain contact coupled to the drain region; and a metallic source contact coupled to the source region and to the epitaxial layer, the metallic source contact having contact with the epitaxial layer at a surface of contact, the surface of contact forming a rectifying barrier in the form of a Schottky diode, the method of operating comprising:

conducting current through the Schottky diode when a forward bias is applied from the metallic source contact to the conductive drain contact ~~to allow no more than 3% to 4% of the source current to reach the substrate.~~

25. (Currently Amended) A method of operating a vertical DMOS transistor in an integrated circuit, the DMOS transistor including an epitaxial layer of a first conductivity type formed over a substrate of a second conductivity type; a drain region of the first conductivity type formed within the epitaxial layer;

a body region of the second conductivity type formed within the epitaxial layer and forming a pn junction diode with the drain region, the body region having an annular body

cmr
F1

region surrounding a central portion of the epitaxial layer; a source region of the first conductivity type formed within the body region, the source region including two annular source regions separated by an annular region of the second conductivity type; a gate electrode positioned above the source region, the body region, and the epitaxial layer, the gate electrode having two annular gate electrodes positioned, respectively, above the two annular source regions; a conductive drain contact coupled to the drain region; and a metallic source contact coupled to the source region and to the epitaxial layer, the metallic source contact having contact with the epitaxial layer at a surface of contact at a central portion of the epitaxial layer to form a rectifying barrier in the form of a Schottky diode, the method comprising:

conducting current through the Schottky diode when a forward bias is applied from the metallic source contact to the conductive drain contact to divert current from flowing through the body-to-drain pn junction of the DMOS transistor to flowing through the Schottky diode that is co-integrated with the DMOS transistor as the source region becomes more positive than the drain region of the vertical DMOS transistor ~~and allowing no more than 3% to 4% of the source current to reach the substrate.~~
